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Title: Universal Bacterial Biosensor

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# Universal Bacterial Biosensor

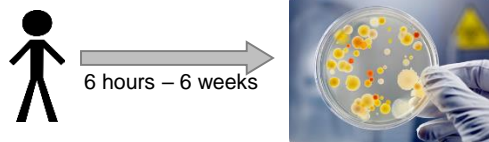
**Rapid differentiation of bacterial pathogens directly in patient blood to inform treatment**

## BACKGROUND & MOTIVATION

**Bacterial infections require rapid diagnosis**

- ↑ Patient survival    ↓ Antibiotic resistance
- Immediate treatment without diagnostics results in overuse of antibiotics
- A rapid point-of-care diagnostic tool is required to inform antibiotic treatment

**Current diagnostics are time consuming**



## INNOVATION

**Simultaneous detection of bacterial biomarkers directly in blood**

- Antibiotics only treat certain infections

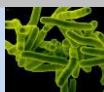
**Gram-Negative**  
*Escherichia coli*  
*Salmonella*



**Gram-Positive**  
*Staphylococcus*  
*Streptococcus*



**Gram-Indeterminate**  
*Mycobacteria*  
*Actinomyces*



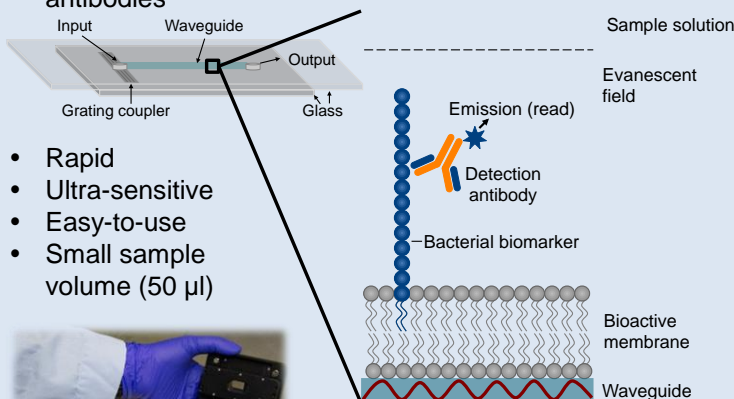
- Differentiating bacteria directly in blood will guide effective treatment
- Rapid diagnosis allows doctors to make timely decisions
- Targeted antibiotic prescription
- Reduced antibiotic resistance



## DESCRIPTION

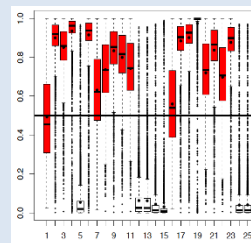
**A universal bacterial biosensor for the rapid differentiation of bacterial infections directly in patient blood.**

- The approach uses a waveguide-based optical biosensor to detect bacterial biomarkers using fluorescently-labeled antibodies



- Cost-effective
- Easy to manufacture
- Patent protected

- Detects bacteria directly in **human blood**
- Validated in clinical samples



**Current Technology Readiness Level (TRL) 4/5**

- Three instrument prototypes developed and tested
- Immunoassays developed, proof of concept demonstrated

## ANTICIPATED IMPACT

**Holy grail: point-of-care universal bacterial biosensor**

- Rapidly diagnose bacterial infections in a **drop of blood**

**Early diagnosis guides antibiotic use**

- Low circulating concentrations hamper available diagnostics
- Our ultra-sensitive biosensor detects low concentrations in small sample volumes
- “Stealthy” biomarkers hamper available diagnostics
- Our immunoassays use host-pathogen interactions to detect “stealthy” biomarkers

## PATH FORWARD

**Clinical Validation**

- Advance immunoassay technology
- Test on human samples in a blinded study

**Technology Transition**

- Sensor miniaturization
- Test platform in point-of-care setting

**Potential End Users:**

- Medical personnel and clinical laboratories

**Point of Contact:**

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• Funded by LDRD Directed Research,  
Integrative Biosurveillance